

June 21, 2007

Mr. Gene St. Pierre  
Site Vice President  
FPL Energy Seabrook, LLC  
Seabrook Station  
P.O. Box 300  
Seabrook, NH 03874

SUBJECT: SEABROOK GENERATING STATION - NRC SUPPLEMENTAL INSPECTION  
REPORT 05000443/2007007

Dear Mr. St. Pierre:

On May 17, 2007, the U.S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection at the Florida Power and Light Corporation's (FPL's) Seabrook Generating Station Unit 1. The enclosed report documents the inspection results that were discussed on May 17, 2007, with Messrs. T. Jones and M. Kiley and other members of your staff.

The NRC performed this supplemental inspection to assess your evaluation of emergency diesel generator (EDG) failures that resulted in the EDG Mitigating System Performance Indicator (MSPI) crossing the Green (very low safety significance) to White (low to moderate safety significance) threshold for the third quarter of 2006. The supplemental inspection was conducted to determine if the root and contributing causes of the failures were understood, to assess the extent of condition review, and to determine if the corrective actions were sufficient to address the identified causes and to prevent recurrence. The inspection was conducted in accordance with Inspection Procedure 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area," and examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license.

Based on the results of this inspection, we concluded that you have adequately evaluated the causes of the failures and the associated performance deficiencies and have identified and implemented appropriate corrective actions. No findings of significance were identified. Given your acceptable performance in addressing the causes of the EDG failures, and the PI returning to Green status in the fourth quarter of 2006, this issue will no longer be considered in assessing Unit 1 plant performance in accordance with the guidance in Inspection Manual Chapter (IMC) 0305, "Operating Reactor Assessment Program."

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Sincerely,

**/RA/**

John F. Rogge, Chief  
Engineering Branch 3  
Division of Reactor Safety

Docket No. 50-443  
License No. NPF-86

Enclosure: Inspection Report 05000443/2007007  
w/Attachment: Supplemental Information

G. St. Pierre

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John F. Rogge, Chief  
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**SUNSI Review Complete:**       JFR       (Reviewer's Initials)

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J. M. Peschel, Manager, Regulatory Programs  
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J. Roy, Director of Operations, Massachusetts Municipal Wholesale Electric Company  
T. Crimmins, Polestar Applied Technology  
R. Backus, Esquire, Backus, Meyer and Solomon, New Hampshire  
Town of Exeter, State of New Hampshire  
Board of Selectmen, Town of Amesbury  
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R. Shadis, New England Coalition Staff  
M. Metcalf, Seacoast Anti-Pollution League

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No. 50-443

License No. NPF-86

Report No. 05000443/2007007

Licensee: FPL Energy Seabrook, LLC

Facility: Seabrook Generating Station, Unit 1

Location: P.O. Box 300  
Seabrook, NH 03874

Dates: May 14 - 17, 2007

Inspector: Larry Scholl, Senior Reactor Inspector, DRS

Approved by: John F. Rogge, Chief  
Engineering Branch 3  
Division of Reactor Safety

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## **SUMMARY OF FINDINGS**

IR 05000443/2007007; 05/14/2007 - 05/17/2007; Seabrook Station, Unit 1; Supplemental Inspection; IP 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area."

The inspection was conducted by a regional inspector. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

### **Cornerstone: Mitigating Systems**

The NRC performed this supplemental inspection in accordance with Inspection Procedure 95001 to assess the licensee's evaluation of EDG failures that resulted in the MSPI Index for Emergency Alternating Current Power System crossing the Green to White threshold. Five failures that occurred in the three year period between 2004 and 2006 caused the PI status change in August 2006. Two of the EDG failures were caused by jacket water cooling instrumentation problems and three failures involved over voltage events caused by voltage regulator malfunctions.

FPL's evaluation of the issues included the performance of apparent cause evaluations for the two events associated with jacket water cooling instrumentation failures and a full root cause analysis to identify the root and contributing causes associated with the three over voltage events. The NRC also conducted a special inspection in response to EDG failures that included the final over voltage event in August, 2006. The results of that inspection are documented in inspection report 05000443/2006016.

Based on the results of this inspection, the inspector concluded that FPL completed thorough evaluations of the EDG events, including associated performance deficiencies and implemented appropriate corrective actions to address the related causes. Given FPL's acceptable performance in addressing the EDG failures, and the PI returning to Green status in the fourth quarter of 2006, this issue will no longer be considered in assessing Seabrook plant performance in accordance with the guidance in IMC 0305, "Operating Reactor Assessment Program."

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## REPORT DETAILS

### 01 INSPECTION SCOPE

The U.S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess FPL's evaluation of the root and contributing causes for five EDG failures that occurred within the past three years and resulted in the MSPI for Emergency Alternating Current Power System crossing the Green/White threshold.

The inspector performed a walk-down of the affected EDGs, interviewed selected FPL staff, and reviewed documents pertaining to the cause evaluations and corrective actions for the events. The inspector also reviewed the corrective actions to ensure the actions addressed both the root and contributing causes for the identified performance deficiencies.

### 02 EVALUATION OF INSPECTION REQUIREMENTS

#### 02.01 Problem Identification

- a. Determination of who identified the issue and under what conditions.

Each of the five failures were self-revealing and occurred during the performance of routine surveillance tests or during post-maintenance testing.

- b. Determination of how long the issue existed and prior opportunities for identification.

FPL's evaluations determined that the two issues involving jacket water cooling system instrumentation failures were caused, in part, by maintenance work activities and were promptly discovered during the subsequent post-maintenance surveillance test. Those events had not presented the licensee with prior opportunities for identification. However, the over voltage events involved long standing hardware deficiencies within the voltage regulators. The root cause evaluation for these events recognized that there had been missed opportunities for identification and correction of the cause of the failures. Corrective actions were implemented to address the failure to more promptly identify and correct the causes of the over voltage events.

- c. Determination of the plant-specific risk consequences and compliance concerns associated with the issue.

The failures of the jacket water cooling instrumentation occurred, and were identified and corrected, during periods when the EDGs were out-of-service for scheduled maintenance. The root cause evaluation of the over voltage events included an assessment of the risk consequences for the voltage regulator failures and determined the increase in core damage frequency (CDF) was approximately  $6.88E-7$ . This assessment was consistent with an independent risk evaluation performed by a Region I senior reactor analyst.

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The event involving the over voltage condition in August 2006 was determined to be reportable to the NRC as required by 10 CFR 50.73 and was reported in Licensee Event Report (LER) 2006-006-001.

## 02.02 Root Cause and Extent of Condition Evaluation

- a. Evaluation of methods used to identify root cause and contributing causes.

The inspector found that the licensee utilized systematic methods to determine the root and contributing causes for each of the EDG failures. The apparent cause evaluations for the jacket water cooling failures used the "5 Whys" root cause analysis method while the root cause evaluation for the over voltage events utilized both the "Events and Causal Factors" and "Barrier Analysis" techniques. Additionally, identification of the causes for the over voltage events involved significant in plant troubleshooting, circuit analysis and simulation, laboratory mock-up testing and individual component failure analysis methods.

- b. Level of detail of the root cause evaluation.

The level of detail of the cause evaluations were found to be appropriate and commensurate with the significance of the event as well as the complexity of the root and contributing causes. For example, the over voltage event investigation included an evaluation of why station processes and programs had not been effective in identifying and correcting the cause of the events when addressing previous similar failures.

- c. Consideration of prior occurrences of the problem and knowledge of prior operating experience.

For each event the licensee cause evaluation did consider prior occurrences and available operating experience. In particular, the evaluation identified that a number of prior over voltage events had occurred and that the corrective actions for those events had not been effective.

- d. Consideration of potential common causes and extent of condition of the problem.

Each of the cause investigations were thorough in assessing the extent of condition and extent of cause for the event. For causes that involved equipment failures, similar other components within the affected system as well as similar components in other systems were assessed and appropriate actions were taken to prevent common cause failures. As a result of the over voltage event evaluation, the extent of cause evaluation included actions to assess other systems which had experienced repeat failures to determine if additional actions were necessary. These actions identified a similar situation involving repeat component failures and resulted in the initiation of a full root cause investigation to identify the root cause of diode failures in safety-related circuit breakers.

- e. Consideration of safety culture components as described in Inspection Manual Chapter 0305.

The inspector found that FPL's evaluation included appropriate consideration of safety culture components and has implemented corrective actions for those items that were determined to have been contributing causes. These components included the trending and evaluation elements of the corrective action program.

#### 02.03 Corrective Actions

- a. Appropriateness of corrective actions.

The inspector found that FPL established appropriate corrective action plans for each of the events. The plans included immediate actions to restore the affected EDG to an operable condition and to address extent of condition issues. The plans also included longer term items to address items such as improvements to station program and processes, training of personnel, hardware upgrades and to assess the need for design changes.

- b. Prioritization of corrective actions.

The inspector reviewed the corrective action plan to determine the status of each corrective action item and found that most of the items had been already completed and that the remaining items had been appropriately prioritized.

- c. Establishment of schedule for implementing and completing the corrective actions.

The inspector confirmed that the remaining open corrective actions have been assigned acceptable completion dates. Actions that were not already complete do not impact the EDG reliability or availability and have been scheduled to be accomplished at the next opportunity.

- d. Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence.

The inspector reviewed the corrective action plan and verified that corrective action CR 06-010146-05 has been established to verify that 1) corrective actions have been completed, 2) no additional similar conditions adverse to quality had occurred, and 3) that the corrective actions to prevent recurrence have not resulted in any new conditions adverse to quality.

**03 MANAGEMENT MEETINGS**Exit Meeting Summary

The results of this inspection were discussed with Messrs. T. Jones, Vice President - Support, and M. Kiley, Plant General Manager, and other members of the Seabrook staff at the conclusion of this inspection on May 17, 2007. Following the exit meeting, a Regulatory Performance Meeting was conducted, by conference call, in accordance with Inspection Manual Chapter 0305, "Operating Reactor Assessment Program," and focused on the performance deficiencies associated with this issue and corrective actions to prevent recurrence. Mr. T. Jones (FPL) and Mr. John Rogge (NRC) participated in the meeting by telephone. No proprietary information was discussed or has been included in this report.

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**ATTACHMENT**  
**SUPPLEMENTAL INFORMATION**  
**KEY POINTS OF CONTACT**

Licensee Personnel

R. Arn	System Engineer
J. Ball	MSPI Coordinator
P. Brangiel	I&C System Engineer
R. Jamison	Design Engineer
T. Jones	Vice President-Support
M. Kiley	Plant General Manager
G. Kotowski	Electrical Design Supervisor
M. O'Keefe	Regulatory Compliance Supervisor
M. Makowicz	Plant Engineering Manager
T. Manning	System Engineer
V. Roberts	Sr. Nuclear Analyst
D. Wilson	Engineering Support Supervisor

NRC Personnel

W. Raymond, Senior Resident Inspector, Seabrook Station  
S. Shaffer, Resident Inspector, Seabrook Station  
J. Rogge, Chief, Engineering Branch 3, DRS

**ITEMS OPENED, CLOSED, AND DISCUSSED**

None

**DOCUMENTS REVIEWED**

Condition Reports

04-02167  
04-04540  
04-04571  
06-07057  
06-10146

Maintenance Work Orders

0702144  
0414709  
0415710  
0415712  
0415713

Maintenance Support Evaluations

06MSE252, EDG Replacement Parts (T-5, L1-L3, MOC-2, & Rectifier Chassis), Rev. 0  
04MSE121, DG Pneumatic Temperature Transmitters, Rev. 01

Procedures

IS1630.4210, DG-T-7A-1 DGA Jacket Cooling Water Temperature Control Loop Calibration,  
Rev. 02, Chg. 01  
IS1630.410, DGA-T-CTHA Jacket Cooling Water Outlet Temperature Switch Calibration,  
Rev. 07, Chg. 02  
LS0589.05, 1A Diesel Generator Static Exciter Voltage Regulator (SEVR) Performance  
Monitoring, Rev. 00, Chg. 02  
LS0589.06, 1B Diesel Generator Static Exciter Voltage Regulator (SEVR) Performance  
Monitoring, Rev. 00, Chg. 02

Miscellaneous

Nuclear Projects - Milestone Phase I Engineering Activities, dated May 7, 2007  
06CAR077, Change Authorization Request - EDG Voltage Regulator, Rev. 0

**LIST OF ACRONYMS**

CDF	Core Damage Frequency
CFR	Code of Federal Regulations
DRS	Division of Reactor Safety
EDG	Emergency Diesel Generator
FPL	Florida Power and Light
IMC	Inspection Manual Chapter
IR	Inspection Report
LER	Licensee Event Report
MSPI	Mitigating System Performance Indicator
NRC	Nuclear Regulatory Commission
STP	Surveillance and Test Procedure
SUNSI	Sensitive Unclassified Non-Safeguards Information